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The Hormonal Control of the Oestrous Cycle*

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Most, if not all mammals, living under natural conditions, experience each year a period of sexual excitement which leads to reproduction. During this time the ovary undergoes cyclical changes commencing with the growth and maturation of the Graafian follicle, followed by its rupture with the discharge of the ovum into the Fallopian tube, and the development of the corpus luteum from the collapsed follicle. The ovarian cycle produces rhythmic changes in the uterus, vagina and mammary glands, called the oestrous cycle, the name being derived from the central point of the cycle—oestrus or "heat"—at which, in most mammals, ovulation occurs and the female is sexually receptive. A normal and regular cycle is, therefore, pre-requisite to the capacity of a mammal to produce living young, and some knowledge of the endocrine mechanism involved in the cycle is essential for the rational treatment of its disorders.

The Initiation of the Oestrous Cycle

That it is the ovarian cycle which controls the changes in the uterus and vagina cannot be denied. It is equally certain that it is the anterior pituitary gland which is responsible for the maintenance of ovarian function, since extirpation of that gland causes ovarian atrophy. By what means, therefore, is the pituitary gland activated at the onset of the breeding season to initiate the chain of events leading to copulation and pregnancy? The pituitary gland reacts to various external environmental stimuli which Marshall (1942) terms exteroceptive factors, and he states that "... it would appear certain that many external factors which regulate the cycle act through the intermediation of the central nervous system upon the pituitary, this gland playing the part of a liaison organ between the nervous system which is affected by stimuli from without and the endocrine system which undergoes more or less rhythmical internal changes associated with gonadal function."

One such factor is light, and much experimental work has been done with the ferret to elucidate the role of light in the initiation and maintenance of the oestrous cycle. It was shown by Bissonette (1932) that if additional (electric) illumination is supplied to ferrets in the winter during the anoestrous period, the onset of oestrus can be hastened. This response, however, is not elicited in ferrets deprived of their pituitary gland (Hill & Parkes, 1933). The converse experiment of keeping oestrous ferrets in conditions of illumination normally experienced by anoestrous animals (Bissonette, 1933), or in almost complete darkness throughout day and night (Hill & Parkes, 1934), proved inconclusive. Anoestrous ferrets blinded by division of the optic nerves do not respond to natural or artificial light so that, in this species at least, the primary receptor for the gonadal response is the retina (Le Gros Clark *et al.*, 1939). The possible pathways by which the visual impulses reach the anterior pituitary gland are discussed by these authors.

The Oestrogenic Hormone

The maintenance of uterine and vaginal function in animals whose ovaries had been removed from their normal site and transplanted elswhere in the body suggested to Knauer of Vienna, at the beginning of this century, that the ovary secreted a substance regulating the reproductive processes. Not until 1912, however, was it shown by Fellner that the injection of a fat-soluble extract prepared from ovarian tissue produced vaginal oestrus in castrated animals.

As a result of this important discovery chemists began searching for the active principle of these ovarian extracts. Two main obstacles confronted them, but their eventual removal by biological workers undoubtedly hastened the isolation of the hormone in crystalline form.

The first of these obstacles was the absence of any reliable method of estimating the potency of ovarian extracts, until Allen, Doisy *et al.* (1924) described the vaginal smear test. This test, which depends on the capacity of the hormone to cornify the vaginal epithelium of the mouse, still remains, in essence, the present-day method of assay. The second difficulty, namely, the inadequate supply of ovarian tissue available to the chemists, was surmounted by the discovery of Ascheim & Zondek (1927) that the urine of the pregnant woman contained an oestrus-producing hormone. With abundant supplies of raw material thus assured, and a reliable method of biological assay at hand, the search was vigorously renewed and by 1930 two crystalline hormones, since named oestrone and oestriol, were isolated from urine of pregnancy.

The question then arose, what was the relationship between these substances excreted in the urine of the pregnant woman and the hormone secreted by the ovary? Meanwhile, by making slight changes in the chemical structure of oestrone, chemists in 1933 reduced it to a substance called oestradiol which had an activity four to eight times that of the parent substance, and two years later the new substance was isolated in the crystalline state from ovarian tissue. It is now agreed that the oestrus-producing hormone is oestradiol and that other substances having a similar action which are found in the urine and elsewhere are catabolic products or metabolites retaining various degrees of activity.

While all this chemical work was in progress it became increasingly clear that some standard unit of activity was essential as, hitherto, workers had evolved their own particular method of standardisation and little agreement existed. The Health Department of the League of Nations convened a conference of interested workers to discuss the establishment of an international standard preparation, a method of assay, and the formulation of an international unit. The international standard was set up and the international unit was defined as the oestrus-producing activity contained in 0·1 μg. or 0·0001 mg. of oestrone. Roughly speaking, one international unit will cause the symptoms of oestrus in the vagina of an ovariectomized mouse weighing about 20 g.

Methods of administration.—Oestrogens, or substances producing oestrus, can be administered by a variety of routes. They can be injected subcutaneously or intramuscularly; they produce a local action on the vagina when given intravaginally or on the mammary gland when they are inuncted on the overlying skin. Yet another method was described by Deanesly and Parkes (1937), who found that absorption took place from a tablet of the solid hormone implanted under the skin. The advantage of this method is that the hormone is being continuously supplied and the animal can, by one manipulation, be provided with the hormone for many weeks; this method is, therefore, most suitable for long-term treatment. A tablet of oestrone is absorbed at the rate of about 5 per cent. of its weight per month. The naturally occuring oestrogens are not orally active, but the synthetic oestrogen, di-ethyl stilboestrol, discovered by Dodds and his co-workers (1938), is as active by mouth as it is by injection. By virtue of this fact, and of the lower cost of production, this synthetic oestrogen has to a large extent superseded the natural oestrogens in both veterinary and medical practice.

Esterification.—Free oestrogens are absorbed at such a rate that the amount of hormone in the circulation is greater than that required to produce its biological action. Anything in excess of this threshold is, therefore, wasted. If, however, the oestrogens are combined with certain organic acids to form esters, *e.g.*, oestradiol benzoate, palmitate, or propionate, their rate of absorption is decreased in a proportion depending upon the nature of the esterifying acid. Provided, therefore, that this rate does not fall below the threshold required for biological action, the time over which they are effective is greatly increased. The optimal rate of absorption of stilboestrol is procured when the substance is combined with propionic acid to form the dipropionate.

Action.—Oestrogens act on the Mullerian duct, *i.e.*, on the duct of the female embryo which eventually gives rise to the uterus, cervix and vagina, causing metaplasia of its glandular epithelium, mucosa and muscular coat. The epithelium of the uterus secretes a fluid which is probably associated with the transport of sperm, while the myometrial changes increase uterine motility. Under oestrogenic stimulation the vaginal epithelium becomes many layered, the uppermost layers become stratified and ultimately cornified. The increased cellular activity liberates lactic acid, which increases the acidity of the vaginal fluid. The action of oestrogens on the ovary is not completely understood.

* Presented to the North Wales Division, N.V.M.A., at Bangor, September 3rd, 1943.

The Relation Between the Pituitary Gland and the Reproductive Organs

The role of the pituitary gland in the maintenance of the oestrous cycle was established by Ascheim and Zondek, and by P. E. Smith almost simultaneously in 1927. The former workers showed that crude suspensions of pituitary tissue injected into immature mice caused intense ovarian stimulation and the precocious appearance of oestrus.

The American worker, P. E. Smith, found that removal of the pituitary gland (hypophysectomy) caused the reproductive organs of the rat to become atrophic and that these degenerative changes could be inhibited by the transplantation of pituitary tissue. If, however, the rats were both hypophysectomized and ovariectomized then no amount of transplanted pituitary tissues sufficed to check the atrophy of the uterus and vagina; the degenerative changes in these organs were, therefore, caused indirectly through the withdrawal of ovarian (oestrogenic) hormone. The action of the pituitary hormone(s) in the female is thus to promote and maintain ovarian growth and for this reason it is called the gonad-stimulating or gonadotrophic hormone.

Gonadotrophic Hormones.—To the chemist the gonadotrophic hormones have proved to be more elusive than the oestrogenic hormone. In spite of ceaseless work on this subject since 1927, by many biologists and chemists, the number of existing hormones involved has not yet been finally decided, nor has a gonadotrophic hormone been isolated in crystalline form; this may be ascribed to the complex nature of these hormones, which appear to be proteins. In addition to their presence in the pituitary gland, gonadotrophic hormones are obtainable from two other sources.

(*a*) *Urinary Gonadotrophin or Prolan.*—In 1928, Ascheim and Zondek discovered the presence of a gonad-stimulating hormone in the urine of women in early pregnancy. This substance appears four to five weeks after the last menstrual period, reaches a peak of concentration at about one month later, and thereafter rapidly declines. Highly purified preparations of this hormone, which is now called chorionic gonadotrophin, are available. An international standard preparation has been set up which contains ten international units per mg.

(*b*) *Mare Serum Gonadotrophin.*—Two years after the discovery of chorionic gonadotrophin, Cole and Hart (1930) discovered that the serum of the pregnant mare contained a gonad-stimulating hormone. It first appeared about the 30th to 35th day of pregnancy, reached a maximum concentration between the 60th and 80th day, and by the 100th to 125th day had completely disappeared. The serum of the small breeds—Shetland and Welsh ponies—appears to be the richest source of the hormone. Unlike chorionic gonadotrophin of human origin, mare serum gonadotrophin is not excreted in the urine. Chemical work on the purification has made great strides in recent years, but, as with the pituitary hormones, its crystallization has not been achieved. An international standard preparation has been established and an international unit defined as the activity contained in 0·25 mg.

Action.—The effects produced on the ovary by gonadotrophins from different sources vary considerably. If the hypophysectomized rat is used as the test animal so that the response will not be complicated by the intermediation of any endogenous gonadotrophin the effect of the injected material from different sources will be as follows:—

Mare Serum Gonadotrophin—Stimulation of Graafian follicles only.

Horse Pituitary Gland—Follicle stimulation, ovulation and luteinization (true corpora lutea).

Sheep and Pig Pituitary Gland—Some follicle-stimulation and excessive luteinization. Ovulation does not occur.

Chorionic Gonadotrophin—No follicle stimulation but intense luteinization of ovarian tissue.

To account for the different responses produced on the same test-object one is led to the conclusion that these preparations contain more than one active substance. In fact, the majority of workers believe that at least two substances are operative, *viz.*, a follicle-stimulating hormone (F.S.H.) and a luteinizing hormone (L.H.), the latter causing ovulation and maintaining the corpus luteum.

A working hypothesis of the mechanism involved in the relation between the pituitary gland and the ovary can now be formulated. The pituitary gland by means of its F.S.H. causes the growth of the follicles, which in turn secrete oestrogenic hormone to produce oestrus. The rising level of oestrogen in the blood exerts an action on the pituitary gland which inhibits the secretion of F.S.H. and at the same time stimulates the secretion of L.H. This in turn causes ovulation and from the ruptured follicle grows the corpus luteum. The secretion of pituitary F.S.H. is held in abeyance until the regression of the corpus luteum, when a new set of follicles grow which rupture at the next oestrus. The function of the two gonadotrophins in this mechanism has recently been shown by Rowlands and Williams (1943), who, by injecting mare serum gonadotrophin (F.S.H.) into hypophysectomized rats to produce follicular maturation, were able to cause ovulation and corpus luteum formation in the same animals by subsequent injection of chorionic gonadotrophin (L.H.).

Ovulation

In between the two stages of the oestrous cycle, *viz.*, the follicular phase (produced by F.S.H. and oestrogen) and the luteal phase (produced by L.H.) the all-important phenomenon of ovulation occurs. Most mammals ovulate spontaneously, but exceptions to this rule are the rabbit and ferret, which ovulate only in response to copulation; in both these species, however, ovulation can be induced by gonadotrophins. The induction of ovulation in the oestrous rabbit by chorionic gonadotrophin constitutes the Friedman test (Friedman, 1929) for the diagnosis of pregnancy in the human.

In most species when ovulation occurs, the ovum leaves the follicle surrounded by a layer of cells, the corona radiata, and around this and embedded in a translucent viscous jelly is another mass of cells, the cumulus cell-mass. Before fertilization of the egg occurs these protective layers are stripped away by the liquefying action on the jelly-like matrix, of an enzyme known as hyaluronidase, secreted by the sperms. The ovum is consequently denuded and the penetration of the zona pellucida of the egg by the single effective sperm occurs.

The Corpus Luteum Hormone

Within a few hours after the rupture and collapse of the Graafian follicle following ovulation a new type of cell appears and almost within a day, in most species, the follicle has become a solid spherical mass of lutein cells—the corpus luteum. A detailed description of its development in the sheep was given by Marshall (1904). It is this organ which is responsible for the initiation and maintenance of the luteal phase of the cycle, and which in pregnancy prepares the endometrium for the implantation of the developing blastocyst. In the early part of this century it was established that the corpus luteum exerted its action by means of a hormone. Excision of the corpora lutea from the ovary in early pregnancy causes abortion, but in late pregnancy, in some species, the work of the corpus luteum is taken over by the placenta, which acts as an endocrine organ.

The search for the active principle of the corpus luteum was taken up by many chemists. First of all an impure active extract was prepared which Corner appropriately named progestin; in 1934 the pure crystalline hormone was isolated and named progesterone. An international standard of progesterone has now been established and the international unit defined as the activity contained in 1 mg. of this preparation.

The function of progesterone is to ensure the successful implantation of the developing embryo. This is accomplished in two ways. In the first place it causes the proliferation of the glandular endometrium and secondly it de-sensitizes the muscles of the uterus to the action of the oestrogenic hormone so that in early pregnancy the uterus exhibits no spontaneous rhythmic contractions.

The luteal phase, initiated by the rising level of progesterone in the blood, is of varying length in different species. In the rat and mouse, where the entire oestrous cycle is completed in four to six days, the luteal phase is of short duration. If, however, mating occurs the life of the corpus luteum becomes prolonged and all the preparations for pregnancy occur. What is it then that gives the corpus luteum a longer lease of life? It has been shown experimentally that if the vagina of an oestrous rat or mouse be stimulated by a glass rod or by a small electric current the onset of the next oestrus is delayed for about ten days. The corpus luteum remains functional over a longer period and the changes in the endometrium, although not marked, are suggestive of those occurring in early pregnancy. It seemes probable, therefore, that the act of copulation stimulates the vagina and/or cervix and it is by these means that the life of the corpus luteum is extended.

In some animals, such as the rabbit, ferret, cat, dog, and fox, there is a long luteal phase. The corpus luteum of the bitch, for instance, in the absence of a fertile mating, remains functional for a period nearly equal to the life of the corpus luteum of pregnancy, and the changes occurring in the endometrium are identical with those taking place in early pregnancy. This condition is known as pseudo-pregnancy, and is accompanied in its later stages by the secretion of milk in the mammary glands.

Conclusions

The research of the past 15 years into the physiology of reproduction has yielded, amongst other things, a whole range of intensely active hormones. Some of these, the sex hormones, secreted by the gonads themselves, are available in crystalline form; others, the gonadotrophins secreted by the pituitary gland and

present in body fluids under certain conditions, although not identified chemically, have been highly purified. The action of all these substances on laboratory animals is, in the main, fairly completely understood.

These hormones are now available to every medical and veterinary practitioner in this and practically every other country in the world, but in the experience of many the practical value of the gonadotrophins has been disappointing. This may be either because they have been used irrationally or because their action in larger animals and man is different from that in small laboratory animals. Little knowledge of their action can be gained from their use in uncontrolled experiments. It is welcome, therefore, than an investigation (Folley, 1943) of the action of the gonadotrophins, first in normal farm animals and then as a means of supplementing any natural deficiency, is being carried out to obtain some definite standard for their more rational use. Only after a critical survey of such an investigation can it be hoped to employ these substances effectively and in a manner commensurate with the care and skill exercised by those responsible for their discovery and isolation.

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Discussion

The President (Mr. W. T. Rowlands), in opening the discussion on Dr. Rowlands address, stated that he personally was particularly interested in the possible role which might be played by oestrogens in the treatment of Trichomoniasis, and asked the speaker's views on this subject.

Dr. Rowlands intimated that oestrogenic therapy might well be worth a trial in the treatment of Trichomoniasis. No direct action of the hormone on the parasites would be expected although some measure of control over them might accrue by rendering their environment unsuitable for their survival. The production of acidity in the vagina and the increase of the tone and vigour of the uterus in response to oestrogenic stimulation might, therefore, prove to be of value in the treatment of this disease.

Mr. Forker referred to the role played by light in the production of oestrus. He thought that poultry keepers had perhaps recognised the importance of light in this connection more than farmers although he had to admit that he had always considered that the object of artificial light in the poultry house was to increase the working hours of the bird—a busy hen was actually a laying hen. He would like to ask Dr. Rowlands (1) did he think that the use of artificial lighting in the byre during the winter months would have any effect in staving off the anoestrus period which in some parts of the country set in during the month of December? (2) Were there any other methods of stimulating oestrus? (3) What part did temperature play? (4) Was there any possibility, in the case of the rabbit, that ovulation in the female might be influenced by a hormone produced by the male?

Dr. Rowlands replied that he did not know of any experiments on the effects of artificial light on anoestrous cattle, but the stimulating effect of light in the small experimental animal at least suggested that a similar response might be elicited in this species by these means. Temperature did not affect the oestrous cycle of animals kept under laboratory conditions; mice maintained at 0° C. for a considerable period were not affected. Diet and particularly the vitamin content of foodstuffs certainly played an important part in the initiation of the oestrous cycle but, with the possible exception of vitamin E, it could not be said that the vitamins by themselves were sufficient to cause oestrus. He did not think that ovulation in the female rabbit was initiated by a hormone in the male secretion but considered that the mechanical stimulation of the vaginal wall during coitus caused the secretion of the gonadotrophic hormone by the pituitary gland.

Mr. O'Neill referred again to the effect of light on the oestrous cycle and asked if a state of anoestrus could be brought about by keeping animals in conditions of complete darkness.

Dr. Rowlands replied that work along these lines had been carried out on ferrets but the results were inconclusive. It would appear that absolute and continuous darkness was essential; the handling of experimental animals for feeding and cleaning purposes under these conditions was impossible.

Mr. Steward mentioned that the incidence of anoestrus in the bovine seemed to run in what were apparently definite geographic belts or tracts. Relatively speaking, this problem was much less serious in the south of England than in the north. This might be explained by the "light" factor since animals in the south were allowed to run out at pasture throughout the winter whilst those in the north were housed often in dark ill-ventilated buildings for a period of approximately four months. He thought, however, that one should not lose sight of two factors which to his mind were equally important as light: (1) the climate in the south was milder and (2) in consequence of this there was a greater quantity of grass which was available over a much longer period. The role played by vitamins A and E had also to be taken into account.

Referring to oestrogens he stated that stilboestrol did not always cause the corpus luteum to regress—this was especially true when the drug was given at "mid-cycle." In practice it was extremely difficult, and in some cases impossible, to procure abortion with this product.

Dr. Rowlands stated that to procure abortion with stilboestrol it must be used early in pregnancy. The amount of stilboestrol required varied in different species; in the human, very large doses were necessary; in the mare, much smaller amounts were required. The concentration of oestrogen and progesterone in the different stages of the oestrus cycle and in pregnancy showed great individual variation, and it was, therefore, not unreasonable to expect that results obtained by oestrogenic therapy should also be variable.

Mr. H. M. Salusbury raised the question of the number of animals which could be fertilized by a single ejaculum. In view of the present improvement of livestock policy he considered that this aspect of the subject was most important. First-class bulls were scarce and no effort should be spared in ensuring that the maximum number of our best cows should be inseminated by these sires in place of the nondescript types some stock owners were using at present. He understood that four or five animals could be successfully inseminated from a single ejaculation and he wished to ask Dr. Rowlands why, in view of enormous number of sperm present, many more females should not be inseminated.

Dr. Rowlands stated that it was probable that successful insemination was not solely a matter of the actual number of sperm injected. Until fairly recent times the opinion held was that the enormous numbers of sperm present in the ejaculum were necessary in order to overcome the hazards of the situation. Nowadays one had to add to this view the part played by the enzyme hyaluronidase, whose function was to liquefy the cumulus cell mass and the corona radiata which surrounded the liberated ovum and thus facilitated the penetration of the ovum by the sperm. Because this enzyme was produced by the sperm it followed that its concentration in the ejaculum, or a dilution of it, would vary with the number of sperm present. Over-dilution, apart from decreasing the number of sperm, would also decrease the enzyme concentration to a point when it would be unable to carry out its function.

In reply to Mr. Llewellyn Jones who asked what number of sperm was necessary for successful fertilization, Dr. Rowlands stated that it was not possible at the present stage to give a categoric answer. More work was necessary.

Captain Broome enquired if hyaluronidase had been produced synthetically.

Dr. Rowlands stated that the enzyme, in addition to its presence in sperm and testis, was secreted by various bacteria, *e.g., streptococci, C. welchii, V. septique*, and was present in snake venom. It had not been produced synthetically but a stable concentrate of the enzyme in powder form had been prepared.

B.W.D.: WARNING TO POULTRY BREEDERS

With the approach of another hatching season the Ministry of Agriculture warns all poultry breeders of the grave risks attending the feeding of clear eggs and incubator waste to birds used for breeding purposes. These eggs may have been laid by B.W.D. "carrier" hens and may, therefore, be infected with the organism responsible for that disease. This organism multiplies rapidly in the warm humid atmosphere of the incubator, and at candling time or when the hatch is taken off, infected eggs are literally teeming with organisms. If they are fed in the mash, a large proportion of birds will become "carriers" and reactors to the blood test. Though the risk of spreading the disease is, of course, greatest where the eggs have come from heavily infected stock, it must be borne in mind that even in flocks where the last blood test was completely negative, infection may be present owing to the introduction of the disease after completion of testing.

The folly of feeding clear eggs to breeding stocks was illustrated recently by the experience of a breeder with a clean flock, who incubated eggs for a neighbour, three-fourths of which proved to be infertile. These were fed in mash by the breeder to his own flock, with the result that when the birds were blood tested for B.W.D. in the following September more than half of them reacted.

Breeders are therefore, strongly advised in their own interests to burn or bury, well apart from any poultry, all infertile eggs not sold, all egg shells and other incubator waste, and all dead-in-shell and cull chicks.

The feeding to breeding stock of raw swill containing egg shells and reject eggs is also most inadvisable. Such swill should be boiled for at least one hour before use, and vessels which have contained unboiled swill should be well scalded out before they are again used. It is best first to wash such vessels with hot soda solution (one double handful of washing soda to 2½ gallons of hot water) and then to wash them well in hot water. Precautions should also be taken to prevent poultry from gaining access to swill before it is boiled or to vessels which have contained unboiled swill, before they are scalded out.

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The value of milk recording has been very evident at the sales of Ayrshire cattle during 1943. A good milk record almost invariably enhances the price; and there was one notable instance at the end of the year in which a non-pedigree bull made the great price of £230—due mainly to the fact that his dam had a good milk record and a few years ago took leading place in Scotland in the Association's list of high-yielding cows.—*Scottish Farmer.*

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At the moment, agricultural research in this country is the concern of several independent bodies, including the essentially teaching institutions and the research institutes, as well as the technical staffs of commercial firms. In many cases they are pursuing parallel courses, and a very strong plea can be made for their direction under a centralised control. The present duplication rather than co-ordination of effort leads to a loss of efficiency, slower progress, and the absence of that valuable stimulus which results from team work.—*Scottish Farmer.*

The Coldlite Vaginal Speculum

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Much has been written of late concerning the importance of bovine infertility and its effect upon the national milk supply. It is generally agreed that a high percentage of the infertility is of a temporary nature and that much of it is associated with endometritis and cervicitis, anoestrus and sub-oestrus (silent heat). Many cases may be diagnosed by rectal examination but in order to ascertain accurately the condition of the cervix and the portio vaginalis, and the character of the discharges, if any, it is necessary to view the parts. Experienced workers in bovine infertility will agree that it is often impossible, without the aid of a vaginal speculum, to diagnose cervicitis with certainty, owing to the difficulty of differentiating by palpation an active case from an old healed lesion, frequently associated with extruding annular bands or other malformation. From time to time vaginal dilators and speculae have been introduced and vision has been obtained by means of an electric torch or an electric light adapter.

Early in 1942 Messrs. Vann Bros. brought out their Coldlite sigmoidoscope, which they subsequently adapted as a bovine vaginal speculum. The advantages of this instrument over its predecessors were readily seen, but extensive trials demonstrated considerable scope for improvement. Suggestions met with ready response by the manufacturers so that the present Coldlite vaginal speculum is a highly efficient and pleasing instrument to use; the more it is used the more indispensable it becomes.

In addition to acting as an aid in the diagnosis of pathological conditions in the cervix and vagina, the speculum is also useful in detecting or confirming the presence of oestrus, particularly in cases of "silent heat" (sub-oestrus). It is recorded that one morning in the early part of this year 24 cows were examined, each with a history of not having been in oestrus since calving in the previous September or October; the bull had been running with these cows from 8 a.m. to 10 a.m. on the morning in question and had taken no notice of any of them. On examination with the speculum, slight oestrous discharge was seen in the portio vaginalis of four of the animals and oestrus was confirmed in each case by the detection of a ripe Graafian follicle. Using a pair of vulsellum forceps through the speculum a little of the oestral discharge was withdrawn to the lips of the vulva, after which the cows were again turned out with the bull, and service was effected in each case.

The advantages of this speculum in connection with artificial insemination are obvious; one is able to see at a glance whether the cervix and vagina are in a healthy condition and clear vision enables the catheter or pipette to be inserted into the cervical canal without any risk of contamination.

The Coldlite bovine vaginal speculum is made in two sizes, for cows and heifers. The former has a diameter of 2 inches and the latter 1½ inches; the working length of both instruments is about 14 inches. They are fitted with an obturator to facilitate easy introduction, and the instruments are contained in a wooden case with leather carrying strap. The necessary electric power is obtained either from a 12-volt battery box complete with canvas cover, or from a mains transformer.

The veterinary profession is fortunate to have had added to its equipment an instrument which is both impressive and efficient. Any veterinary surgeon interested in bovine fertility or infertility will find this instrument indispensable.

These speculae are made of methyl methacrylate plastic which possesses the quality of being able to transmit clear cold light throughout its entire length. Although the light source is remote from the instrument, the distal end is floodlit with clear cold light and there is no obstruction in the lumen either for inspection or operating purposes. The instrument may be boiled for sterilising purposes in the same manner as steel instruments, and may be described in all normal use as unbreakable.

Brit. Pat. No. 551146

CONTROL OF TUBERCULIN REACTORS

Somerset County Council has adopted a recommendation of its Milk Committee urging the securing of amending legislation requiring all animals which react to the tuberculin test to be suitably marked, so that milk producers owning licensed herds would run no risk of introducing reactors among their stock.

Mr. C. Harden suggested that farmers who had T.T. milk licences should be persuaded to have any reactors found in their herds slaughtered.

The Chairman (Sir R. Hobhouse) said the Committee had put forward this policy, but it had been turned down on the ground of expense.

Mr. Austin said reactors should be branded, and then farmers would know what they were buying. He had seen men pay up to £80 each for cows which had really been offered for sale because they were reactors.

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The Melbourne Correspondent of *The Times* reports that two platypuses (duck-moles of Australia) in Healesville sanctuary for Australian fauna, having made zoological history by breeding in captivity.

COMBATING TUBERCULOSIS IN EIRE

Studying statistics covering a period of ten years, investigators of the Anti-Tuberculosis Section of the Irish Red Cross Society have ascertained that for every 100 deaths there have been 146 new cases of tuberculosis, a ratio which, the Society's monthly bulletin says, corresponds almost exactly to that of England and Wales. With this knowledge, they will now be able to estimate with much greater accuracy than before the number of beds needed for the treatment of the disease. The Section is now discussing with local authorities the possibility of adopting the American Framingham scheme, while the Survey Committee is considering aspects of primary tuberculosis and the economics of a long-term scheme.

Measures agreed on by the Section's Veterinary Committee, which are supported by the Veterinary Medical Association, include the education of farmers and public on the advantages of eradicating bovine tuberculosis; the establishment of tubercle-free herds and a segregated market for the exclusive use of tuberculin-tested cattle. The Committee has drawn up an insurance scheme to compensate owners whose cattle would have to be slaughtered.

THE VETERINARY RECORD
January 29th, 1944

THE PLACE OF PATHOLOGY IN VETERINARY SCIENCE

FOR many centuries before the eras of bacteriology and biochemistry careful *post-mortem* examinations were being carried out and the correlation of clinical symptoms with *post-mortem* findings was laying the foundation of scientific medicine. Working in Vienna, Rokitansky (1804-78) organised *post-mortem* examinations on an enormous scale and in 1866 wrote his thirty thousandth protocol. After his work the names of diseases like pneumonia and typhoid fever conveyed for the first time to the medical graduate an anatomical picture and not as before a list of symptoms of varying complexity.

The stir caused by the discoveries of Pasteur, Koch and many others and the possibilities of producing a successful vaccine against any one of the important bacterial diseases led to a partial neglect of the older and less spectacular science. During the last six years the advances in bacterial chemotherapy have opened up immense possibilities, and these, together with the work on hormone therapy and internal metabolism, provide an attractive field for research. These new subjects should however always be related to a full understanding of pathology, without which, particularly when it comes to clinical application, they may go astray; it remains as true as ever it was that morbid anatomy, both micro- and macroscopic, is a fundamental discipline of medicine.

This has always been realised by some men: Sir John M'Fadyean maintained his interest in morbid anatomy and histology during the whole of his career and his work provided a basis for the teaching of veterinary pathology in Great Britain for many years. Men destined to become the outstanding clinicians of their day have always realised that their skill can only be based on a careful correlation of clinical symptoms with *post-mortem* findings. Unfortunately veterinary practitioners often have to make long journeys to see *post-mortem* examinations and although many of them do this and obtain information and experience which can be gained in no other way, they obviously cannot conduct the intensive study necessary to elucidate some of the major disease problems.

In the planning of research to solve specific problems pathological investigations are sometimes apt to be overlooked. To mention only two conditions of outstanding importance at the present time, it is doubtful if the well-trained veterinary student could yet be given an anatomical picture of the various normal changes or disease processes in the bovine udder or genitalia. The treatment of bovine sterility is attracting much attention. One school of thought claims that it is largely due to various grades of endometritis, and another that, except as a post-parturient condition, a true endometritis is very rare, and that the various forms of sterility are due to hormonal upsets. A number of people are making a special study of bovine infertility but although it is clear that the above controversy cannot be completely resolved without an intensive pathological study of the genitalia, we are not aware that this work is being undertaken. It is, however, encouraging that a team of workers at one of the veterinary colleges is making a detailed study of the pathology and pathogenesis of tuberculosis and mastitis in the bovine.

There are many obvious reasons why pathology should be especially encouraged at the colleges and it is to be hoped that eventually they will all have really adequate facilities for studying one or more of the important diseases of domestic animals. There is perhaps much truth in Dr. McEwen's contention[1] that a large and model knackery should be an integral part of each educational centre. As he pointed out, apart from its value for teaching, a fuller knowledge of the causes of loss and wastage in farm stocks would be obtained than is now available when no systematic examinations are made and no records kept.

[1] *Vet. Rec.* (1943.) **55**. 298.

ABSTRACTS

[Bladder Displacement Due to Pelvic Fracture. Wilcox, W. A. (1943.) *J. Amer. vet. med. Ass.* **102**. 289-290. (2 radiographs.).]

A case is described in which the subject, a male Cairn terrier, aged two years, sustained an oblique fracture of the pelvis running through the symphysis pelvis, as a result of a street accident. A firm enlargement was visible between the penis and the left inguinal region, which was thought to be an inguinal hernia. At a later stage pressure on the swelling caused the passage of urine from the penis, and the author decided to operate.

It was found that the bladder was protruding through a slit in the prepubic tendon, 2·5 cm. long, which commenced posteriorly at the anterior end of the fracture. After replacing the bladder into the abdomen, the slit was sutured and the fractured parts of the pelvis were approximated by silver wire. Recovery was uneventful. J. W. D.

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[Safety Pin Sutures in Veterinary Surgery. Ammann, K. (1942.) *Schweiz. Arch. Tierheilk.* **84**. 223-226. (4 figs.).]

It is often difficult to appose the edges of large wounds in the horse because of tissue tension. The author overcomes this difficulty by the use of strong steel safety pins. A series of pins in position, the wound edges are brought together by suture material applied around the pins figure eight fashion. Pins of various sizes are used. In the average case the author uses a pin 14 cm. long and 1 to 1·5 mm. diameter. An advantage is the ease with which they can be applied and a needle holder, so often necessary in suturing skin wounds in the horse, can be dispensed with. Safety pin sutures should be of use in accidental wounds, particularly perhaps on the battlefield where facilities naturally are limited. C. F.

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[The Teart Pastures of Somerset. IV—Effect of Continuous Administration of $CuSO_4$ to Dairy Cows. Ferguson, W. S. (1943.) *J. agric Sci.* **33**. 116-118.]

The control of "teart" in Somerset (a molybdenum intoxication) by the administration of copper sulphate to affected cattle raised the question of possible injurious effects due to continuous copper ingestion. Six cows were given 2 g. $CuSO_4$, $5H_2O$ daily, mixed with the food, for periods of ten to 18 weeks. The cows remained healthy throughout, and though some elevation of blood Cu level was observed, the variations lie within what is accepted as normal limits, the highest level recorded being 0·26 mg. p.c. These results indicate that no serious effects are likely to be encountered by the use of copper sulphate in the doses recommended for the control of teart. A. E.

Weekly Wisdom

Consider the dog, which has been for countless ages the servant of man. Think how he may be trained to perform various duties, watching, hunting, etc. We know that this complex behaviour of the animal, undoubtedly involving the highest nervous activity, is mainly associated with the cerebral hemispheres. . . . In astounding contrast with the unbounded activity of the cerebral hemispheres stands the meagre content of present-day physiological knowledge concerning them. . . .

When, therefore, we ask the questions: What do these facts which have up to the present been at the disposal of the physiologist explain with regard to the behaviour of the higher animals? What general scheme of the highest nervous activity can they give? or what general rules governing this activity can they help us to formulate?—the modern physiologist finds himself at a loss and can give no satisfactory reply. The problem of the mechanism of this complex structure which is so rich in function has got hidden away in a corner, and this unlimited field, so fertile in possibilities for research, has never been adequately explored.—I. P. Pavlov's Conditioned Reflexes: an investigation of the physiological activity of the cerebral cortex. English translation. Lecture 1. 1927, Oxford Univ. Press.

REPORT

[Scientific Research and the Universities in Post-war Britain. Issued by the Parliamentary and Scientific Committee, Courtfield House, Courtfield Road, London, S.W.7, price 1s.]

If Britain with her small area is to maintain her position in the post-war world and carry out her plans for reconstruction and social betterment, scientific research and the application of scientific knowledge will have to be promoted on a far bolder and more imaginative scale than in the period between the two world wars, and in the opinion of the Parliamentary and Scientific Committee, this applies equally in fundamental, industrial, agricultural, veterinary, medical and other allied fields.

The first part of this report is entitled "The Need for Increased Research" and deals in turn with general considerations and with the requirements of fundamental research, agricultural, veterinary and medical research, industrial research and university research. It is pointed out that in these times scientific progress depends largely on team work directed by first-class brains, followed by practical application and testing on a large scale and that for this the present scale of provision is inadequate and vastly inferior to that of the U.S.A. or U.S.S.R., and that as a result, Britain was before this war tending to fall behind these countries; the U.S.A., for example, with a population about three times as large was spending at least ten times as much as Britain in both university income and total research expenditure. Importance is attached to a considerable development of pure or fundamental research as the essential basis of future applied science. Expansion is also called for in agricultural, veterinary and medical fields, the view being taken that the future impact of biological advances in agriculture, medicine, nutrition and sociology may well be of the same national importance as that of physics and chemistry in the last half century and that there is need for increased research in cognate subjects such as genetics, ecology, biophysics, biochemistry and various branches of veterinary science. Large scale development of industrial research of the kind under discussion by the Federation of British Industries and outlined in the reports of bodies representing special industries, electrical, radio, gas, etc., with adequate Governmental support, is recognised as an urgent need. The financing of universities is also regarded as inadequate under modern conditions and with regard to their dual function of training scientific workers and conducting fundamental research. "We ought, in fact, to look forward to spending at least ten times as much annually after the war on research and development in order to provide the necessary basis without which neither our agriculture nor industry can meet the needs of the future."

The second part of the report deals with "The Supply and Training of Research Personnel" necessary to the developments outlined, and the need for expansion of the universities and technical colleges and an all-round improvement in the teaching of science and scientific principles at all stages of education for the whole school population. Effective organisation of the demobilisation of the large number of scientific people now on war work or in the Services is needed to enable them to complete their training and to guide them into suitable posts. The universities should prepare for a rapid increase of students in science and technology. State assistance in the form of scholarships, bursaries, cadetships and grants, pre- and post-graduate, should be continued and considerably increased in number, scope and value, whilst materials and finance should be correspondingly made available for the expansion of research schools in the universities. University staffs, stipends and buildings should all be increased and a capital sum of £10 million will be required for buildings and equipment in the first five years after the war. The present Treasury grant to universities of approximately £2¼ millions per annum should be increased to £6 or £7 millions per annum. The freedom, independence and diversity of the universities should not in any circumstances be prejudiced, but to ensure the best use of the increased funds they should set up a Universities Advisory Council. The recent Government assurance that they recognise the need for increasing provision for technical education is welcomed, and the hope is expressed that the proposal for a revision and expansion of the £12 million scheme of development mooted before the war will be put into effect without delay. Greater assistance and facilities for part-time courses for promising young people in industry are also called for, together with courses in "laboratory arts" and grants thereto. The status and remuneration of laboratory technicians also require improvement and the supply and training of technical teachers need urgent investigation. Finally it is recommended that there should be a considerable increase in the Parliamentary Grants-in-aid to the Royal Society for scientific investigation and publications.

The whole breadth and balance of the report reflects the quality of the work done by the Parliamentary and Scientific Committee and provides profitable reading. Its purchase can confidently be recommended.

IN PARLIAMENT

The Future of Agricultural Education

Mr. R. S. Hudson, Minister of Agriculture and Fisheries, addressing the House of Commons after Questions prior to the second day's debate on the Education Bill (second reading), said:—

It may be useful to the House if I amplify the reference made yesterday by my Rt. Hon. Friend the President of the Board of Education to the Government's intentions about the future of agricultural education. The Government have been very greatly assisted in their consideration of the whole question by the Report and recommendations of the Committee presided over by Lord Justice Luxmoore. The House may recall that the two main recommendations of that Committee were that the advisory services which have for their object the improvement of the efficiency of those engaged in the agricultural industry should be formed into a unified national service and that agricultural education at farm institutes should be transferred from the County Councils to the Central Government and be financed wholly by the Exchequer.

The Government have carefully considered the Luxmoore Report and have also given full weight to the subsequent representations submitted by the County Councils' Association and other interested bodies. The conclusions which the Government have reached are as follows:—

First, the Provincial and County Advisory Services should be unified and combined into one National Service for the whole country directly under the Minister of Agriculture and financed wholly by the Exchequer. The permanent establishment of such a service means in fact a continuation and development of the large measure of unified direction and co-ordination of this advisory work which has been so successfully exercised in connection with the food production campaign during the war.

Secondly, while recognising the administrative and other advantages of placing agricultural education at farm institutes under the same central control as the National Advisory Service, the Government has decided that having regard to the importance, not least in the interests of agriculture itself, of integrating agricultural education with the general educational structure of the country as proposed in the Bill now before this House, the provision of agricultural education at the farm institute level and below should remain a function of the local authority, but in its capacity as a local education authority, and on a mandatory basis instead of permissive as at present. At the same time, in view of the close relationship which must subsist between agricultural education and the National Advisory Service, agricultural education will call for some special treatment within the general framework and for the same reason will continue to be grant-aided through the Ministry of Agriculture. As a piece of permanent machinery a Joint Advisory Committee will be set up by my Department and the Board of Education to advise on general educational policy and methods of training at farm institutes. The education offered at the Institute will be inspected by H.M. Inspector of the Board so far as concerns all subjects other than the actual theory and practice of agriculture which will be the province of the officers of my Department. The institutes will be inspected by inspectors of the Board of Education, as well as by inspectors of the Ministry of Agriculture.

The Government recognises that there is a growing unsatisfied demand throughout the country for education of the kind provided by farm institutes. Many more institutes than exist at present will have to be provided as circumstances permit. This keenness and enthusiasm must not be wasted and I propose to consult with County Councils to see how far it may be possible, without detriment to the food production campaign, to meet immediate needs by providing such training at existing institutes or at centres which would have to be improvised.

I hope to introduce legislation at an early date to give effect to these proposals where necessary.

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QUESTIONS

Veterinary Inspectors

Sir P. Hurd asked the Minister of Agriculture if he has made any estimate of the number of veterinary practitioners who would be required for the periodical inspection of dairy herds; the number now available; and the period which must elapse before a full complement could be enrolled and trained.

The Minister of Agriculture (Mr. R. S. Hudson): It is anticipated that the existing staff of whole-time and part-time veterinary inspectors will be able to carry out the increase of the total number of dairy herd inspections involved by the programme outlined in paragraphs 7 to 10 of the recent White Paper.

Mr. George Griffiths: Is it not a fact that the number of practitioners we have will not be sufficient to inspect these herds more than once in a twelvemonth and that there are some inspectors who are doing it in rural districts not oftener than once in three months?

Mr. Hudson: I am fully aware of the difficulty. No one is more acutely aware of the shortage of veterinary inspectors than I am, but I said in my answer that we consider that we shall have sufficient numbers to carry out the inspection referred to in paragraphs 7 to 10 of the White Paper.

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Milk Inspection

Sir P. Hurd asked the Minister of Agriculture if he has considered the representations of the Sanitary Inspectors Association and the local authorities concerned that the sanitary inspectors are fully competent to carry out all necessary improvements in the administration of the law relating to milk supplies within the existing framework of local government; and if he will act accordingly.

Mr. Hudson: The reply to the first part of the Question is in the affirmative. With regard to the latter part, I would refer my hon. Friend to the Government proposals contained in paragraphs 13 to 15 of the recent White Paper upon measures to improve the quality of the nation's milk supply.

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Agriculture: Long-term Policy

Mr. Granville asked the Minister of Agriculture whether discussions are proceeding for the purpose of agreeing and announcing a long-term agricultural policy; and when such a statement is likely to be made.

Mr. Turton asked the Minister of Agriculture what progress he has made in his consultations with the industry on post-war agricultural policy.

Mr. Hudson: Exploratory and confidential discussion have been opened with representatives of the agricultural industry on the subject of agricultural policy in the transitional and post-war periods. A wide field has to be covered and the discussions will necessarily take some time to complete. The results will in due course be reported to the War Cabinet, and I am not in a position at this early stage to say when a statement of policy is likely to be made.

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Poultry Industry

Mr. De la Bere asked the Minister of Agriculture whether he will confer with the Minister of Food for the purpose of discussing the post-war reconstruction of the poultry industry, in order that a pronouncement may be made at the earliest possible date by the Government, assuring existing poultry keepers of a reasonable living for the future, with special regard to the valuable protective food contained in eggs, and that the claims of ex-Service men will be considered and arrangements made for their training and setting up in the poultry business.

Mr. Hudson: The future of the poultry industry will be considered in the course of the discussions with representatives of the agricultural industry on post-war agricultural policy generally.

Mr. De la Bere: Will my right hon. Friend make an early public announcement, so that poultry keepers throughout the United Kingdom will know where they stand, as his recent pronouncement has caused much lack of confidence and misunderstanding? May I not have an answer to this question?

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Scientific Research

Rear-Admiral Sir Murray Sueter asked the Lord President of the Council whether, in considering the question of scientific research and the universities in post-war Britain, he will also consider setting up a scientific research clearing bureau to enable research results at the universities, other research centres, Government laboratories, etc., to be made easily available to all Services and industry, and that the necessary steps be taken to improve the liaison between all in this respect.

The Lord President of the Council (Mr. Attlee): Yes, Sir. In the preparation of plans for the organisation after the war of scientific research in the national interest, special consideration will be given to improving the existing ways in which the results of scientific research can best be made known and applied to the development of industry and the Fighting Services. The examination given to previous proposals for a clearing house for scientific research suggests, however, that this may not be the best way of achieving the desired result.

Colonial Development (Anthropological Research)

Sir E. Graham-Little asked the Secretary of State for the Colonies whether he will consider and take steps to meet both the urgent need for anthropological research in questions of colonial development and the present lack of data both as regards physical development in various colonial races and the incidence of disease, the determination of which depends upon vital statistics, and the demand for which has constantly been stressed but has never been met; and whether he will institute a national anthropological survey board for the furtherance of which both material and personnel are now available at several British universities.

Colonel Stanley: The Colonial Research Committee, whose first progress report was recently published, has in its preliminary survey of the present state of knowledge about the Colonies in every field of science given special attention to the necessity of increasing our knowledge in the anthropological field, and in other aspects of social science. In particular they have recently made a recommendation, which has been accepted in principle, for the temporary appointment of a distinguished expert in demographic statistics to draw up specific plans for action to be taken in the various Colonial Dependencies and I am confident that that will lead in due course to a considerable improvement in the standard of information available. The establishment of a national anthropological survey board is a rather wider matter, which does not fall entirely within my sphere.

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Guard Dogs

Wing-Commander Grant-Ferris asked the Secretary of State for War whether he is aware that excellent results have been obtained by the use of police dogs for guarding such places as dumps against pilfering; and what steps are being taken to extend the scheme, especially as the South African personnel who were to be used for handling are not now available.

Sir J. Grigg: Many dogs have already been provided for guarding places of importance both in the United Kingdom and overseas. Most of the men who handle dogs come from this country and I do not understand my hon. and gallant Friend's reference to South African personnel.

H.M. STATIONERY OFFICE PUBLICATIONS

The undermentioned have been published recently. Copies can be purchased through any bookseller, or directly from H.M. Stationery Office.

	Price net s. d.	*Post free* s. d.
Command Papers (Session 1943-44):		
[6494]. Hill Sheep Farming in Scotland. Committee on (Chairman, Lord Balfour of Burleigh) Report. December 13th, 1943 ...	2 0	2 2
[6498]. Hill Sheep Farming in England and Wales. Committee on (Chairman, The Rt. Hon. Earl De La Warr, P.C.). Report, August 27th, 1943	0 9	0 11
Scientific and Industrial Research, Department of: Food Investigation Board. Index to the Literature of Food Investigation. Vol. 14. No. 4, March, 1943. (47-71-39)	4 6	4 8
Agriculture and Fisheries, Ministry of: Leaflet Advisory, 15. "Husk" or "Hoose" in Calves ... ... each	0 1	0 2
doz.	0 9	0 11

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Dr. F. Ronald Edwards, of the University of Edinburgh, records in *The British Medical Journal* the successful use of bovine blood as a transfusion substitute for human blood. Clinical trial in 26 cases indicated that it might be safely administered rapidly and in large amounts to man, but final judgment must await the results of further experiment.

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The control of equine encephalomyelitis through the resort to chick-embryo vaccination continues on a large scale where the disease prevails. Researches on this virus disease have shed additional light on the nature of encephalitides of man, especially in respect to insect vectors, which account for the high incidence of these diseases in the summer in man and animals. Chick-embryo propagated vaccine used in horses and mules to protect against this disease has been crowned among the notable medical discoveries of this period, as serious disease of horses transmissible to man yields obediently to a simple, inexpensive vaccination.—*Veterinary Science News Letter.*

NOTES AND NEWS

The Editor will be glad to receive items of professional interest for inclusion in these columns.

Diary of Events

Feb. 2nd.—Meeting of the Editorial Committee, N.V.M.A., at 36, Gordon Square, W.C.1, 2.30 p.m.; Advertisements Sub-committee, 2 p.m.

Feb. 3rd.—Meeting of the Central Veterinary Society, Conway Hall, W.C.1, 2 p.m.

Feb. 5th.—General Meeting of the Association of Veterinary Inspectors, Central Station Hotel, Glasgow, 2 p.m.

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Revision of Control Scheme

It is proposed in the near future that representatives of the Ministry of Agriculture, the National Veterinary Medical Association and the National Farmers' Union shall meet to review the working of the scheme for the control of certain diseases of dairy cattle. The Association is anxious to receive the views of members on this matter and, in order to assist in the collation and analysis of members' replies, the following questions are suggested; information on any aspect not included, however, will also be appreciated:—

1. Has the control scheme resulted in fuller collaboration in disease control generally?

2. Has the operation of the control scheme resulted in an increase of professional work on the farm in respect of diseases not included in the scheme?

3. To what extent has the publicity afforded to the control scheme resulted in an increased demand for the application of control measures outwith the scheme in respect of mastitis, contagious abortion, infertility (including pregnancy diagnosis) and Johne's disease?

4. In connection with which of the four diseases do you consider the control measures have been most successful?

5. Please state briefly the reasons which, in your opinion, have contributed to the success or failure of the control scheme.

6. Can you suggest any improvement in the working of the control scheme in general, and particularly as it affects (*a*) the Ministry, (*b*) the practitioner, and (*c*) the farmer.

7. Do you consider that the present scheme could with benefit be extended to include control measures for other diseases and/or other classes of animals? If so, state which.

It is hoped that members will endeavour to make their criticisms helpful, whether they be of a constructive or destructive nature.

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GENERAL OBITUARY

Dr. W. W. C. Topley, M.D., F.R.S.

The world of science, and of agriculture in particular, has lost an able champion of progress in the sudden death of Dr. Topley, Secretary of the Agricultural Research Council. Topley died in harness, whilst going through correspondence soon after his arrival at his office on January 21st, 1944, at the age of 58 years.

Topley was educated at the City of London School and at St. John's College, Cambridge, where he gained a First Class in the Natural Science Tripos. He qualified M.R.C.S., L.R.C.P., from St. Thomas's Hospital in 1909, and became M.B. (Camb.) in 1911 and M.D. in 1918, when he was also elected Fellow of the Royal College of Physicians. He became Assistant Director of the Pathological Laboratory at St. Thomas's Hospital (1910), lecturer on bacteriology at Charing Cross Hospital (1911-22), professor of bacteriology at Manchester University (1922-27), and professor of bacteriology and immunology of the University of London at the London School of Hygiene and Tropical Medicine (1927-41). He was a member of the Medical Research Council from 1938-41 and he was responsible at the outbreak of war for the organisation of the Emergency Public Health Service. In 1941 he was appointed Secretary of the Agricultural Research Council.

Topley's main work was concerned with experimental epidemiology, a subject which formed the basis of his Goulstonian Lecture in 1919, Milroy in 1926, the three Harben Lectures in 1926 the Linacre Lecture at St. John's College, Cambridge, in 1940, and the Croonian Lecture (Royal Society) in 1941. He was awarded the medal of the Royal Society for his outstanding work on experimental epidemiology and immunology. He published numerous articles in medical journals and was author of "An Outline of Immunity" (1933) and—with Professor G. S. Wilson—of "Principles of Bacteriology and Immunity" (second edition, 1936).

It is difficult to know when Topley first became interested in veterinary matters, but it is probable that his lifework on the spread of infection led him to read in the veterinary field at an early date. At Manchester his interest was awakened more directly in that he organised the course for the D.V.S.M. By the time he joined the London School of Hygiene he was keenly interested in the profession, he believed in its great future and was one of its strong supporters behind the scenes both in this country and abroad.

For a number of years he was a frequent visitor at the meetings of the Veterinary Research Club, and was much impressed by the enthusiasm and ability of many of the younger veterinary research workers. It is probable that as a result of his great interest in the diseases of animals he was attracted to the work of the Agricultural Research Council. He had previously been a member of the Diseases of Animals Committee of the Agricultural Research Council for many years, becoming a member of the Council for a short while before assuming the Secretaryship in 1941. As Secretary he quickly applied himself to the many problems of agricultural research and spared himself no pains to gain an intimate knowledge of any branch of work by close association with those actually carrying out the work. Later on he reorganised the committee system prevalent in the Council and formed instead groups of workers actively engaged upon particular problems. These small groups would discuss the work and agree to allocate different sections of it to various individuals, further meetings being held to discuss progress at convenient intervals. He had twice served as a member of the committee reviewing research upon foot-and-mouth disease and now took a keen interest in all branches of veterinary studies, particularly those of mastitis in cattle (a report of this work is shortly to be published); contagious abortion in cattle with special reference to methods of control; tuberculin; the use of B C G vaccine in the control of bovine tuberculosis; the value of phenothiazine as an anthelmintic in sheep and the part played by trace elements in such diseases as "pining" in sheep. Indeed, much of Topley's time at the A.R.C. was devoted to the furthering of investigations by veterinarians. With its two Directors, the late Major G. W. Dunkin and Dr. W. S. Gordon, Topley was also keenly interested in the development of the A.R.C. Field Station at Compton.

He was not only deeply interested in agricultural development in this country, but was also a member of three colonial research bodies and of a committee reviewing the work of the agricultural bureaux. At the time of his death he was very actively engaged in assisting the furtherance of plans for the veterinary development of colonial territories.

One of Topley's greatest traits was his wish to make conditions sufficiently attractive in the agricultural sphere, not only to draw young and promising recruits but to retain them and even to enlist scientists of standing. He was responsible for the creation of three research units under eminent scientists, one at Cambridge in animal physiology under Sir Joseph Barcroft, F.R.S., one in London on insect physiology under Dr. V. Wigglesworth, F.R.S., and the third at Rothamsted on soil enzyme chemistry under Dr. J. Quastel, F.R.S.

Despite his very great activity in all work connected with his official duties, Topley found time to read extensively and interest himself in wider problems, particularly those concerned with post-war planning. He was a member of the Scientific Advisory Committee to the War Cabinet and was keenly interested in the Education Bill.

He will be greatly missed by very many individuals and bodies, but it is safe to assert that he will be missed by none more deeply than by those veterinarians intimately connected with plans for the future of the profession and its work.

W. R. W.

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Mrs. Jackson Young

Benevolent Fund Bequest

We learn with regret that Mrs. Margaret Edith Young widow of William Jackson Young, died on December 25th, 1943.

Mrs. Young, who was an active member of the Ladies' Guild, sent a donation of £5 to the Victoria Veterinary Benevolent Fund a few days before her death, in response to the appeal for Christmas gifts. We are informed that she has bequeathed £500 free of duty to the Victoria Veterinary Benevolent Fund.

PERSONAL

Mr. Walter Gardner, M.R.C.V.S., of Maybole, Ayrshire, has now received direct news from his son, Walter, who has been a prisoner in the hands of the Japanese since the fall of Hong Kong.

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Marriage.—Bugg—Wilkins.—On January 1st, 1944, at St. Mary's Church, Aylesbury, R. R. Bugg, M.R.C.V.S., elder son of Mr. and Mrs. R. L. Bugg, of Kenton, Middlesex, to Phyllis, elder daughter of Mr. and Mrs. A. E. Wilkins, of Calcutta.

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LEGAL NOTES

Alleged Breach of Warranty in Sale of Horse.—An interesting case was heard at the Hereford County Court by His Honour Judge R. H. Roope Reeve, K.C., arising out of the purchase of a bay gelding at an auction sale of horses at Hereford in April of last year. The plaintiff's case was he bought the bay gelding for the sum of 22 gns. on the warranty that the animal was quiet to ride and drive. When, however, put into the shafts of a two-wheeled trap the horse turned a complete somersault and broke one of the shafts, causing itself a severe injury which necessitated considerable treatment by a veterinary surgeon. Plaintiff claimed £64 11s. 4d. damages. Defendant counterclaimed for £50 11s. 11d., damages representing the cost of keep and the fees of a veterinary surgeon following the return of the animal to him.

In evidence, plaintiff (Mr. Harry Leach, of Pendlebury, near Salford) said that on the Sunday morning following the sale, he and his two men tried out the horse in harness. It went quietly for about 150 yards and then it turned a complete somersault, ending up with its head facing the trap and with broken end of the shaft sticking out of the pad of the saddle piece. Plaintiff later returned the horse to the auctioneers.

A pad was exhibited in court and in cross-examination the plaintiff and his witnesses adhered to their statement that this was the pad placed on the horse on the day in question.

The defendant (Mr. C. F. Jones, horse dealer, of Cardiff) said he had the horse for 17 months before the sale, and it was one of the quietest horses he had ever driven. His daughter had ridden it through the main streets of Cardiff. When he fetched it from the auctioneers it was in a terrible condition and there was a wound on the shoulder blade two to three inches deep. After being treated by a veterinary surgeon and "built up" again, the horse was as quiet as ever. He maintained that the horse's unusual behaviour was probably caused by a broken piece of saddle wounding it.

Mr. T. G. E. Gibson, a Cardiff veterinary surgeon, expressed the view that the wound was caused by a damaged saddle and, in answer to the Judge, he said he did not consider that the pad produced in court was the one placed on the horse.

In summing up, the Judge said that each party to some extent was in the hands of the other, in that the evidence given on both sides was really incapable of contradiction. The defendant, for instance, was not in a position to contradict what happened when the plaintiff tried out the horse, and, in the absence of any upsetting evidence, his Honour felt compelled to accept the description given by the plaintiff and his witnesses concerning the horse's behaviour, and, consequently, to find that the horse did not come up to the warranty.

The Judge went on to say that he could not accept the hypothetical theory that the wound was caused by a damaged saddle piece—if he did it would mean he thought the plaintiff and his witnesses were guilty of perjury.

His Honour gave judgment for the plaintiff for £60 with costs and dismissed the counterclaim.

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U.S. BUREAU OF ANIMAL INDUSTRY

Certain of the changes announced in our columns last year as pending among the leading personnel of the United States Bureau of Animal Industry, due to retirement, have now taken place. The fourth in the line of distinguished veterinarians who have held the position of chief of the Bureau since its organisation in 1884 is Dr. Arthur W. Miller who succeeds Dr. John R. Mohler. Following his graduation from the Kansas City Veterinary College in 1901, Dr. Miller entered the service of the Bureau, eventually being assigned to administrative work in Washington, D.C., in 1917. He has had the unusual distinction of having headed three divisions of the Bureau as chief: Field Inspection, Packers and Stockyards, and Interstate Inspection. He was appointed Assistant Chief of the Bureau in 1928.

Dr. Adolph Eichhorn, who has been Superintendent of the Animal Disease Station of the Bureau at Beltsville, Md., since October, 1938, retired from active duty on October 31st, 1943. He was made Chief of the Pathological Division, at Washington, in 1915, but resigned the following year to take a position with the Lederle Laboratories, remaining with this company as Director of the Veterinary Department until the year of his appointment to the Disease Station.

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LEVERHULME RESEARCH FELLOWSHIPS, 1944

The Trustees invite application for Fellowships and Grants in aid of research, these being intended for senior workers who are prevented by routine duties or pressure of other work from carrying out research. They are limited to British-born subjects normally resident in Great Britain. In exceptional circumstances the Trustees may waive the condition as to residence. The Trustees are also prepared to consider applications from groups of workers engaged upon co-operative programmes of research, particularly from those engaged upon long-distance programmes or in institutions in which the normal facilities for research have been curtailed by the war. The duration of the awards will not normally extend over more than two years or less than three months and the amount will depend on the nature of the research and the circumstances of the applicant.

Forms of application may be obtained from the Secretary, Dr. L. Haden Guest, M.C., M.P., Leverhulme Research Fellowships, Unilever House, Blackfriars, E.C.4. Applications must be received on or before March 1st, 1944. Awards will be announced in July and will date from September 1st, 1944.

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TREND OF PRODUCTION OF WINTER MILK

Mr. J. L. Davies, Ministry of Agriculture, addressing a Press conference on the trend of production of winter milk, said that it was the policy of the Minister to get more milk in winter, and to improve the dairy herds. By increasing the winter supply a better foundation is being laid for improving dairy farming in the future.

Last year was the most favourable we had ever had for milk production. The milk figures were still going up. Mr. Davies showed that the figures last winter from October to December had been exceeded in each of these months in 1943. The increases are: October, 1·8 per cent.; November, 5·7 per cent.; December, 7·5 per cent. Taking the three months together, the total quantity was well in excess of the figures of 1938, the most favourable pre-war year.

The consumption of milk in liquid form had increased very considerably during the war, and the trend continued. The total quantities consumed in the period October-December had increased by 30 per cent. in 1943 compared with 1938. In the industrial areas before the war there was an incredibly low consumption of milk. Now those who had the least quantity of milk before the war were getting adequate supplies.

The Victory Churn Contest, which was launched in 1942 to stimulate the production of more milk, is being run this year on the basis of winter production, without reference to the summer output. Interim placings show that among the leading counties are the West Riding of Yorkshire, Cheshire and Staffordshire.

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Foot-and-mouth disease was confirmed last week among cattle at Farnsfield, Nottinghamshire.

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MINISTRY OF AGRICULTURE NEWS SERVICE

Making sure of a Healthy Herd.—There is little doubt that the demand for milk and milk products will increase still further after the war, provided the milk is of good quality and sold at a reasonable price. The surest way of getting these things is a determination to control disease, for, apart from gaining the full confidence of consumers, it results in a greater quantity of milk from the same number of cows.

Most important of all is to remember that every illness responds more readily to cure or control if early measures are taken. Disease cannot be satisfactorily controlled by allowing it to reach an advanced stage in animal or herd before the veterinary surgeon is called in. Professional advice will prove far more valuable, both to the individual owner and to the community, if it is sought at the first signs of trouble; in fact, the proper use of veterinary advice is to consult it regularly on questions of hygiene, building construction, breeding, feeding and disease control, for all these matters may materially affect the health of the herd.

Artificial Lighting of Cowsheds.—Black-out in the cowshed is always a troublesome business. But the fact that the building may

be far from a village or other houses is no excuse for slackness. A very efficient system has been installed on a Yorkshire farm. Proper black-out material has been nailed to the bottom of the windows, the top edge of each piece of cloth being fastened to a wooden lath. From the centre of the lath a cord passes over a pulley at the top of the window. By pulling the cord and twisting around a nail, black-out is easily and quickly accomplished.

Another method that has been suggested is the use of orange coloured bulbs and blue paint. Orange light will not penetrate through blue, and with blue painted windows and orange coloured bulbs in the cowshed the black-out is complete. During the day opening the windows improves lighting in the shed; and the orange coloured bulbs are said to give adequate illumination for work during black-out hours.

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Stalled According to Yields.—The chief value of milk recording is that it makes for more efficient feeding and herd management. If autumn calvers fail to maintain their peak yields beyond the first eight to ten weeks after calving, there may be something wrong in the feeding, watering or milking. If heavy yielders slump and low yielders hold on much better, it is probably the ration that is at fault—perhaps too much fibrous fodder and too little protein, or lack of condition at calving.

Although, at first, it may be troublesome teaching the cows their new places, it is helpful, both to feeding and milking, if they are graded in their stalls according to yield. The heavy yielders should be milked first in the morning and last in the evening. Their milk must, however, be mixed with that of low yielders, otherwise there will be trouble through certain churns being low in fat contents.

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Keeping Milk Cool in Winter.—Most milk producers know that among the main causes of sour milk are unclean milk utensils, dirty churns and exposure to the sun, for long periods, of churns containing milk, and that the gowth of bacteria causing souring is largely influenced by the efficiency of cooling and the atmospheric temperature. For this reason most producers are careful to cool their milk without delay during the summer months and to protect it from the sun.

The National Milk Testing Scheme has proved, however, that in certain areas the percentage of category "C" milk under the standard routine test was as high last December as it was in June. This was partly due to the weather in December, but more particularly to the fact that many producers were not cooling their milk during the winter months. Milk producers are, therefore, urged to continue the routine cooling of milk throughout the winter, both in the morning and in the evening, and to cleanse and sterilise milk production equipment all the year round.

Experience has shown that the dangers of dust, flies and hot weather, typical of summer months, are replaced during the winter months by black-out, the continued housing of cows and the greater delay in transport due to weather conditions and short days. The occasional spells of exceptionally mild weather in winter favour the rapid growth of souring organisms in uncooled milk, particularly when the milk is placed in churns, where it falls to atmospheric temperature very slowly. The best results are obtained with a surface cooler, provided this is properly cleansed and sterilised after use. But adequate cooling can be obtained by standing the churn in water—preferably running water. Using either method, it should be easy to cool milk rapidly to below 55° F. on almost every farm in winter and so put paid to sour milk during winter.

CORRESPONDENCE

Letters to the Editor should reach the Office not later than by the first post on Monday morning for insertion in following Saturday's issue.

The views expressed in letters addressed to the Editor represent the personal views of the writer only and must not be taken as expressing the opinion or having received the approval of the N.V.M.A.

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R.A.V.C. OFFICER RECRUITMENT URGENCY

Sir,—It is common knowledge that in the early days of this war opportunities for the employment of veterinarians in their own profession in the armed forces were few, and the enthusiasts who demanded to take an active part in the war, many. Those enthusiasts quickly joined the R.N., R.A.F. or one or other of the fighting branches of the Army and so became, in many instances, lost to their profession for the duration of the war.

After this had happened the responsibilities of the Royal Army Veterinary Corps, which had been declining for a period, suddenly assumed large proportions. The Corps is now responsible for many thousands of animals overseas and its duties are multifarious. It is concerned with the provision of all animals which are required for military purposes, for the maintenance and training of all animals and reserves for the British Army and in certain cases for other Arms of the Services. It arranges to deal with all captured animals and for their exploitation to the best advantage. The care of sick and wounded animals is its especial responsibility and naturally the efficiency of the Service is directly reflected in the speedy return of animals fit for further service. The Corps, through its conducting units, relieves fighting troops of all non-effective animals and replaces them with trained remounts held in the forward areas against casualties.

The prevention of contagious disease is a vital factor in the life of any Army which depends on animal transport for its supplies. This entails repeated thorough inspection of all animals. Diseases which have caused the greatest anxiety to date are anthrax, encephalomyelitis, epizoötic lymphangitis, foot-and-mouth disease, glanders, horse sickness, pleuro-pneumonia, rinderpest, strangles, surra, variola ovina.

Commanders of formations and units rely on the advice of veterinary officers in all questions of animal management and horse mastership. In these days of mechanisation this is an important responsibility and the utmost tact coupled with determination are required before success is possible.

The R.A.V.C. inspects all animals purchased for food and maintains depots where animals are fattened. The provision of these depots has had a marked effect on the quantity and quality of meat produced in certain theatres of war. Other activities of the Royal Army Veterinary Corps include meat inspection, pig farms, rabbit farms, the cultivation of fodder and vegetables and other activities which cannot be disclosed.

It is hoped that this brief statement will help the profession to understand the urgency with which additional young men are required as officers in the Royal Army Veterinary Corps.

I am, Sir,
Your obedient Servant,
G. A. Kelly, *Brigadier*, Director,
Army Veterinary and Remount Services.

The War Office,
Droitwich Spa, Worcestershire.
January 19th, 1944.

DISEASES OF ANIMALS ACTS, 1894 TO 1937, AND AGRICULTURE ACT, 1937 (PART IV).

Summary of Returns of Confirmed Outbreaks of Scheduled (Notifiable) Diseases

Period	Anthrax	Foot-and-mouth	Parasitic Mange*	Sheep Scab	Swine Fever
Dec. 16th to 31st, 1943 ...	8	9	—	33	23
Corresponding period in—					
1942 ...	24	8	1	18	17
1941 ...	12	—	1	44	24
1940 ...	20	42	—	31	170
Total Jan. 1st to Dec. 31, 1943	283	27	9	257	547
Corresponding period in—					
1942 ...	372	670	28	283	451
1941 ...	399	264	21	255	1,088
1940 ...	564	160	19	228	5,019

Note.—The figures for the past year are approximate only.
* Excluding outbreaks in Army Horses.

Tuberculosis (Attested Herds) Schemes

The number of Attested Herds, *i.e.*, herds officially certified as free from Tuberculosis as at December 31st, 1943, was as follows :—

England	Wales	Scotland	Total (Great Britain)
3,962	8,637	3,480	16,079